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To John W. Har*

AN
INQUIRY
INTO THE
USE OF THE OMENTUM.

BY JAMES RUSH

OF PHILADELPHIA



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AN
INAUGURAL DISSERTATION
FOR
The Degree of Doctor of Medicine.
SUBMITTED TO
THE EXAMINATION OF THE
REV. JOHN M'DOWEL, LL. D. PROVOST,
THE
TRUSTEES AND MEDICAL PROFESSORS
OF THE
University of Pennsylvania.
ON THE 19TH DAY OF APRIL, 1809.

THE UNIVERSITY OF CHICAGO

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THE UNIVERSITY OF CHICAGO

TO BENJAMIN RUSH, M. D.

PROFESSOR OF THE INSTITUTES AND PRACTICE OF MEDICINE, AND OF CLINICAL PRACTICE, IN THE UNIVERSITY OF PENNSYLVANIA.

HONOURED SIR,

For favours which I can neither express nor repay, I beg your acceptance, in this public manner, of the acknowledgments of your affectionate and grateful son and pupil,

JAMES RUSH.

ALSO TO

CASPAR WISTAR, M. D.

PROFESSOR OF ANATOMY;

JAMES WOODHOUSE, M. D.

PROFESSOR OF CHEMISTRY;

BENJAMIN SMITH BARTON, M. D.

PROFESSOR OF MATERIA MEDICA, NATURAL HISTORY, AND BOTANY;

AND TO

PHILIP SYNG PHYSICK, M. D.

AND

JOHN SYNG DORSEY, M. D.

UNITED PROFESSORS OF SURGERY,

IN THE UNIVERSITY OF PENNSYLVANIA,

AS A TESTIMONY OF GRATITUDE

FOR THEIR CIVILITIES, AND THE INSTRUCTION DERIVED FROM

THEIR LECTURES,

THE FOLLOWING DISSERTATION

IS INSCRIBED,

BY THEIR OBLIGED FRIEND AND PUPIL,

JAMES RUSH.

AN INQUIRY

INTO THE

USE OF THE OMENTUM.

NOVEL opinions in science, like the essays of infant speech, are often faltering or false. Let it be considered, however, that the falter may become the tone of authority, and that error detected lessens the embarrassments of truth. These reflections countenance the attempts of theory, and encourage the adventurer with hope. It is true, the period has been anticipated when observation and books should have yielded their contribution to the writer ; but the subject has been entered upon, from a conviction that system in arrangement and method in reasoning, give their advantages to the framer. He who benefits an individual does a plausible duty, and such is his beneficence, who renders a service to himself. Truth lies hidden beneath the surface, and though theory cannot always make the discovery, it may work upon the spot of its concealment : a better occupation surely than his, who indolently waits, vainly imagining it will take root, and spring up under his feet.

The theories or reasonings in physiology, and their importance to practice, have been particularly the objects of cavil. Many of the functions of the human body can be explained only by analogy; as if nature, for the comprehension of her noblest work, required the exertion of man's noblest faculty. The enemies of physiology object not to its established, but to its unknown doctrines. The practical utility of those already proved, are too obvious to admit of dispute. The circulation of the blood, the process of digestion, and the actions of the intestines, are truths, without the knowledge of which even the empiric could scarcely practise. These were the result of physiological researches; and were once as obscure as many things yet to be discovered. This is my apology for considering a speculative subject in physiology.

In the list of subjects for discussion, an inquiry into the use of the omentum in the animal structure, has been suggested by the doctrine of the office of sanguification, lately, ascribed to the liver, by my father*. To this function, he has also attributed the conversion of fat into the matter of nourishment for the body. This opinion I have embraced, and by its more particular application to explain the intention of the omentum, shall endeavour to treat it with more minuteness than the author himself has devoted to it in his lectures.

* See Medical Museum, Vol. III—Dr. Rush on the functions of the liver, spleen, &c.

It would be tedious to consider, at length, the structure and other anatomical circumstances of the omentum. It will be sufficient to observe, that it is a pendulous membranous body, folded so as to form a cavity resembling a sack ; attached to the stomach by its anterior, and to the colon by its posterior fold ; hanging between the anterior parietes of the abdomen and intestines ; extending commonly as low as the umbilicus. It consists of two thin membranes, united by cellular substance, and is well supplied with blood-vessels. The cellular substance uniting these two membranes is the seat of the fat, which is the more immediate object of this essay.

The uses ascribed to the omentum have been many and various ; some of those generally received shall be the objects of consideration.

I. Its office has been supposed to prevent the injuries from the friction of the intestines upon each other, by furnishing an oleaginous fluid to lubricate them.

It has long been the practice of physiologists, to measure the intentions of nature by their own ingenuity. Hence the explanations of the pulsations of the heart ; of the equilibrium given to the body by the spleen ; and of the lubricating quality of the omentum. I object to this opinion, first, *because it is too mechanical*. Although, strictly considered, every natural operation must be mechanical, yet physiology has often suffered from a confusion of the attenuated laws of vital action, with the grosser rules of the arts or mechanism

of common life. Secondly, *it is not necessary*. We know that moisture alone, is sufficient to give facility of motion to parts pliant and polished; now the intestines are under these circumstances, with regard to themselves, and the peritoneum. Thirdly, *by its fat it cannot lubricate the intestines*. The omentum is not a fat-secreting surface, but a fat-containing cavity: its surface affording nothing except that moisture which is natural to all internal membranes, and this I have spoken of as abundantly supplied without the aid of the omentum. Fourthly, the supposition that it is to *prevent friction*, only substitutes, for attrition, a substance less regular and yielding than the peritoneum it is intended to cover.

II. A second use which has been ascribed to the omentum is, that it is intended, with other abdominal viscera, to prepare blood for the formation of bile. Here, from an accidental, and at the same time an unavoidable circumstance, is deduced a conclusion not warranted by any proof: *accidental*, as the liver was placed in the cavity of the abdomen, and *unavoidable*, as it could receive its blood from the viscera of no other part. If we infer from this situation of the liver, that a change takes place in the blood of the vena portarum, this change must be produced by each particular viscus, or it must be the joint operation of all. It cannot be the former, for each of the several parts secreting a different substance from the blood, must give a different quality of blood to be returned. If it be the

latter, disease in those parts must prevent the formation of the peculiar hepatic blood. Let it not be said, that disease or obstruction of these preparing viscera is often attended or followed by fatal consequences to the system. To this it may be answered, that these parts are vital in other respects than their relation to the circulation of the blood. Moreover, if the bile require this oily secretion, why is the fat thrown out into cells? It ought to pass directly on to the liver through the veins; as this is not its course, it can get there only through the medium of the absorbents. To suppose it first secreted, effused into cavities, and afterwards taken up by lymphatics, is to admit a prolix, where nature has a more simple process.

This opinion is grounded upon the fact, of fat being found in the omental branches of the vena portarum; and from this has been explained the oily nature of the bile. The inference from this fact is, that the liver is not a secretory organ, but a filter. It is impossible however that *acini* so minute as to prevent the passage of blood, should give admission to so viscid a substance as fat, of such a size as to be the object of examination by the eye. The bile does not derive its oily nature from the fat; we have seen that it cannot pass by filtration, it must undergo the secretory action. Now the very essence of secretion is an alteration of chemical properties, which if the fat suffer, it cannot form the oil of the bile, for, take the most minute portion of its principles away, and you destroy its nature as fat.

III. A third opinion advocated for the use of this viscus, is that it serves to keep the intestines warm. If this should need a refutation, I would observe: First, it will apply only to hibernating animals. In their living state, nature has prevented the evil arising from a defect of warmth, by placing these viscera near the greatest source of heat. Secondly, if it were true, the want of such a provision would be felt elsewhere. Why has not the brain its hood, or why is the thorax without its breast-plate?

This opinion is deduced from the fact, that very fat people feel the cold less sensibly than those who are lean. But this is to be ascribed to the effect it has upon the nerves. Richerand, in speaking of the uses of the fat, says, "and finally, it covers and surrounds the extremities of the nerves, diminishing their susceptibility, which is always in *an inverse proportion to corpulency*." Again, "In fact, persons subject to nervous affections, constantly join an *extreme leanness* to an *excessive sensibility**."

Other opinions of the uses of this organ have been proposed. They will be omitted to give place to one, to the support of which the following pages shall be devoted.

I shall endeavour to prove the omentum to be *an organ for the secretion of fat, furnished with vesiculæ for its reception, in order to supply the body with nourishment, when the resources by the stomach fail.*

* Physiology. Article lxxvi.

The arguments for the support of this proposition will be deferred, till the consideration of some circumstances which are connected with this view of the subject.

That fat nourishes the body in certain states is no new idea ; the phenomena of its existence were too obvious not to lead to that conclusion. As an old doctrine, it has little meaning. Blood is the only medium of nourishment with which we are acquainted ; but the fat has not yet become blood. How is this effected ? It may be said that it is produced by the lymphatics and their glandular system. This may be answered, by observing, First, whatever change is the effect of their action, it is certain they do not completely convert it into blood ; nay, they do not even form a chylous substance, but a more limpid fluid. Secondly, fat has been found in the branches of the vena portarum. A sufficient proof that it has passed, with little or no alteration, the action of the lymphatics : it being immaterial whether it has gotten into the veins by a set of partial vessels, or has passed the circle of the general absorbent system. The change then must be made after it enters the circulation, and nowhere is there a cause adequate to that, except in the lungs or the liver. It cannot be in the lungs, for chyle has been found in the blood after it has passed through them.

It remains then for the liver to perform the office in question, and this I shall now consider more in detail.

“ The design of the liver,” says the author, in the essay referred to, “ I believe to be, to receive the blood from every part of the body, in order to subject that part of it which has not been completely animalized, or divested of its chylous properties, to a secretory process, and afterwards to pour the product of this secretion, mixed with the liquor of the pancreas, into the duodenum, to be absorbed or otherwise taken up by the lacteals, and conveyed with the chyle from the stomach into the blood-vessels, in order to be completely converted into red blood, for the purpose of serving the various and important uses for which that fluid is intended in the human body.” It would consume too much time to give, at large, the facts and reasonings used by the author to support this proposition. I shall give an abstract of them. The same power that *perfects* the chyle, converts the fat to a like matter ; and as this is one of the ideas embraced by this essay, its proof may be required.

The arguments in support of this doctrine are,

“ 1st. The presence of the liver, in nearly all animals, being in this respect on a footing with the stomach.”

“ 2d. The immense and disproportionate size of the liver in the fœtus, compared with that of the adult, the design of which appears to be, that nourishment may be carried on exclusively by that viscus, without any aid from the stomach.”

“ 3d. The size of the liver in adults, and the quantity of bile secreted, said by Haller to be twenty-four ounces in 24 hours.”

“ 4th. Chyle has been found in the blood after it has passed through the lungs; hence it requires another process.”

“ 5th. The quality of the venous blood from which the bile is secreted. It is less disposed to putrefaction than arterial blood in any part of the body. This arises from the chyle it contains, as chyle is less putrescent than blood.”

“ 6th. The quality of hepatic bile, it being sweet. Haller says, “*dulcior hepatica cystica amara.*”

“ 7th. Several experiments of Dr. Fordyce prove chyle to be formed by the action of saliva and gastric juice upon the aliment, without the mixture of hepatic bile.”

“ 8th. The structure, situation, and function of the pancreas. It resembles the salivary glands in its structure; it secretes a liquor which possesses the same dissolving and animalizing properties as the saliva; and it pours this liquor so directly upon the hepatic bile, as to change it into perfect chyle.”

“ 9th. It is inferred that a second chylopoietic process goes on in the liver, from the effects of intemperance upon it. It increases its labour, and thereby increases its size.”

To the above arguments in support of this opinion of the function of the liver, I shall add the following observations. Doctor Pemberton, in his treatise upon the

diseases of the viscera*, has taken a view of the glands of the body, as divided into those that secrete a fluid from the blood for the use of the system, and those that secrete a fluid to be discharged from it. The former he has called glands of supply ; the latter, glands of waste. He has satisfactorily shown, that derangements of the glands of waste are not attended by any alteration in the bulk of the body ; whereas disease in the glands of supply, in almost every case, produces emaciation. The liver is an organ, the diseases and disorders of which cause a wasting of the flesh. This gives it a place among the glands of supply. I would however infer that it serves this purpose, more than is generally allowed ; for if so great a quantity of bile as 24 ounces, which is secreted in 24 hours, be not excrementitious, how considerable must its effect be in nourishing the body ! It is known that gall-stones obstructing the biliary ducts produce emaciation. This has been ascribed to the effect of the irritation of pain upon the system. I would rather suppose it to be owing to the obstruction to the flow of bile, when the stone is in the ductus communis ; and when it is in the cystic duct, to the irritation, by continuous sympathy, causing a vitiated secretion of bile.

With these views of the liver as established premises, I shall proceed to exhibit the proofs of the proposi-

* See "A Practical Treatise on Various Diseases of the Abdominal Viscera," by C. R. Pemberton.

tion laid down, on the subject of the intention of the omentum.

This viscus seems not to be one of those whose use is inscribed upon it so legibly, as not to need the efforts of reason to decypher it. The appearance it exhibits to the eye, is not sufficient to manifest its operations. It is of such inconsiderable importance to the animal system, as not to give by its own derangements any very sensible alteration to the functions of the body, or at any rate it has its office vicariously supplied. From this view we may see why the separation of parts of it, its adhesions, and every other preternatural state of it, have so little effect upon the body. Hence too the difficulty and inefficacy of any experiments, to which it could be subjected. There exist, however, facts enough connected with its ordinary phenomena, as exhibited after disease, to afford just conclusions of its use. To this add its fitness for the office here ascribed to it. For though the sufficiency of a cause be not an undeniable argument for its agency, yet it is essential to proof.

It has been said before, that *the omentum is an organ for the secretion of fat, furnished with cells for its reception*. This is true, whatever be the intention of the fat when secreted. It is true, because it is seen. I know of no other argument for its proof. Beside the evidence of our senses, proof requires the mediation of axioms. There is no assertion more self-evident. I might indeed vary its form, but, like the revo-

lutions of a sphere, it would not bring a greater compass into view*.

The second part of the proposition to be considered is, that *the omentum is intended for the purpose of supplying the body with nourishment when the resources by the stomach fail.* My belief in this arises from the following facts.

1st. *From the situation of the omentum*, being in that part of the body where it can afford none of those offices, which the fat in other parts of the system supplies. These are, giving shape to the body, lubricating for the advantages of motion, filling up unavoidable cavities, and serving as the envelope of some viscus or organ. Here is no rugged angle of feature to be smoothed. Here is no eye whose delicateness the contact of bone would injure.

2d. *From its little sensibility*, known from the removal of parts of it, and from its circumstances in hernia and wounds. From this I would infer an aptitude for its intention to admit of variation in its size by its distention with fat: a property which, had it not possessed, would have subjected it to the inconveniences of pain.

3d. From its presence in so many animals, taken in conjunction with

4th. Its absence in others. It would be tedious to enumerate the different animals in which this viscus is found, as well as those in whom it is wanting. The

* Perhaps we might urge its great vascularity, and its diseases, hydatids and schirrus, in favour of its being a secretory organ.

exceptions to it, give the best idea of its use. For here, as in the forms of mathematical evidence, the substitution is more easily understood. When the omentum is wanting, its place is supplied by a substance which allows scarcely a doubt of its use, and to ascribe to that substance the generally received uses of the omentum, would be absurd. There is only one office, which these adipose substances appear capable of affording, and that is, the nourishment of the body by their fat. This, indeed, is universally allowed. Haller, speaking of the use of the omentum, says: “*Qua tamen animalia omento destituuntur, iis adipis massa pro omento est; avibus nempe aquaticis aliisque et piscibus**.” But without the argument arising from this circumstance, even were this substitute wanting, still its absence would not be an unanswerable objection. The qualities that animals possess are variously, but not partially bestowed. Hence the want of one is supplied by the presence of another similar to it, or equally important. If the omentum should be wanting in some animals, this would not prove that they were denied the advantages that others received from it, or that it was useless in those that had it. It would be explained by these three circumstances: first, that the animals had other peculiarities of structure, as important; secondly, that fat was to them not so necessary; or, thirdly, that the existence of this fat would be inconsistent with some other property more advantageous to the animal.

* *Elementa Phys.* vol. vi, p. 381.

5th. I infer the use I have ascribed to this viscus from the state of the omentum in *hybernating animals*. Besides the quantity of fat throughout the cellular membrane generally, and an omentum much distended with it, these animals have two lateral appendices, like the omentum in their structure and intention. Haller speaks of this appearance in some of these animals, “*ut sint tria quasi omenta†.*” Now, what is the occasion of this great provision? The only circumstance that distinguishes these animals from others, is their remaining, for a certain time, without the resources of the stomach for food. Corresponding to this is the state of the omentum. There is no other peculiarity of these animals that requires this difference. There is not more need for lubrication, not more oil required for the bile, nor is it necessary for any other of the imaginary uses ever ascribed to the omentum.

The views arising from this class of animals are so interesting to the subject, that they will be considered more fully.

Cuvier, in his observations on this subject, mentions a fact, which, by indicating a use for the omentum, seems to be an objection to that one I wish to establish. “*Le grand épiploon, suspendu comme un rideau entre les parois musculeuses du bas-ventre, et les circonvolutions des intestins, modère sans doute un peu les froissemens que ceux-ci pourroient éprouver des pre-*

* Haller's Physiology, vol. vi, p. 381.

mières, et sert particulièrement à retenir dans les intestins la chaleur qui tend continuellement à s'échapper vers la circonference. L'histoire des membranes graisseuses dans les animaux qui hibernent, va nous confirmer dans cette dernière opinion. Lorsque l'estomac est plein d'alimens, cet épiploon est raccourci et relevé sur sa face antérieure, de manière à la recouvrir plus complètement qu'avant. Il rend alors plus particulièrement à ce viscère le service que nous venons de lui attribuer à l'égard des intestins. En même temps le sang passant moins facilement dans ces vaisseaux, coule plus abandonnément dans ceux de l'estomac, dont les premiers ne sont que des divisions, et y sépare une plus grande abondance des sucs gastriques*.”

What seems to be of importance here is, that the omentum is found investing the stomach, whilst it is employed in digestion. A little inquiry will give this an explanation. Observations on animals with the stomach thus enveloped, have been made when the animal was in its living state, well supplied with aliment from the food it was taking, and before the store of fat was laid up for its winter support. Now, that a membrane, thin and vacillating, should, by the constant peristaltic motion of the intestines, be contorted from its natural dependent situation, is not extraordinary, but purely accidental and natural. Before the action of the stomach has ceased to be required, the wants of the animal have

* Leçon xxii, p. 86.

called for an accumulation of fat. When the cells of the omentum have become distended, the most economical situation for this membrane is extended and flat. Hence it leaves the stomach, and is spread upon the intestines. But why, according to Cuvier's idea, does this change take place? The bowels are not more active than the stomach; nor is there any other reason why they require more warmth. The last part of this quotation supposes that another advantage is given to the stomach, by this folding of the omentum causing a greater secretion of gastric liquor. This is not the only viscus to which this office of supplying blood to the stomach, has been ascribed. The spleen is even yet supposed to be for that purpose. They are both equally untrue. The greater flux *alone* of blood in any viscus, never tends to increase its secretions. This is proved by the phenomena of the circulation and of fevers. Exercise is not, when violent, immediately followed by an increase of all the secretions; nor are inflammations of the liver and kidneys always attended by a preternatural flow of bile or urine. An unusual quantity of blood, in any part, produces disease, or is disease itself. It would be well, if, by secretion, an organ could thus easily rid itself of its irritating cause. Celerity or energy of chemical attractions alone, can give rapidity to secretion.

Some of the species of the hybernating animals are destitute of the omentum. The account given of such animals will sufficiently obviate any objection that might arise from it. Cuvier, in speaking of the hy-

bernating class, says, “ Les oiseaux des mœurs analogue, tels que l’hirondelle de marais, plusieurs reptiles que hibernent de même sont depourvus aussi de ces membranes graisseuses ; il est vrai que leur *peritoine* se charge pendant l’hiver *d’une graisse abondante.*”

6th. From the defect of fat in the omentum of the fœtus. “ Tenue in fetu, in adulto homine varie obesum*.” This is a fact of great importance. In the fœtal state the supply of nourishment is nearly uniform. The minute arterial connection of the placenta with the uterus, prevents the effects of a hurried or disordered circulation upon the fœtus. Hence there is but little alteration of the volume of blood sent to it, under every irregularity of the mother. With such a constant and unvaried supply, the office of the omentum in the fœtus would have been unnecessary. Soon after birth the fat is deposited, for then the want of it begins to be felt.

7th. I infer it, from its distention with fat more particularly than any part of the body, in those disposed to obesity. Whatever purpose the fat serves, that must be more eminently in view in the omentum, as it contains the greatest quantity. It has been shown that its offices in other parts of the body have no concern here. Its more obvious and important intention of serving as nourishment, alone remains of its uses.

8th. From its state when divested of fat ; being reduced to a slender contracted membrane, and so much diminished, as to be apparently not fitted for any purpose

* Elementa Phys. vol. vi, page 367.

in the animal economy. The histories of dissections contain many accounts of a partial or total loss of this viscus. Of these I shall mention one, as quoted by Portal, in the case of a patient who had died of pulmonary consumption. "The other viscera were flaccid, pale, and void of blood. *The omentum was destroyed*, and the body reduced to such a degree of emaciation, as to resemble a very skeleton*." Here it was not destroyed, as parts of the body often are, by local disease, nor was it absorbed, as parts are when removed from their natural situation. But in a phthisical subject, where the cause of the death was seated in the lungs, its disappearance could have arisen only from the great demand for nourishment, which attends this lingering disease. Not only in this case was the fat absorbed, but its whole substance, as if the membranes, when they had lost their contents, being useless, were themselves taken for food. Perhaps the ludicrous observation made by Mr. Bell, of the impossibility of lymphatics absorbing themselves, might be urged here. I cannot, however, see any more error in it, than in the intussusceptio and sphacelation of an intestine. But, even admitting the impossibility of this, certainly one lymphatic may absorb another. It will be no objection to this to say, that, whilst the vessel is in a living state, it cannot be subject to the laws of inorganized matter. In reality I know no difference between the laws of

* Observations sur la Nature et sur le Traitement de la Phthise Pulmonaire, par Antoine Portal. Page 227.

living and of lifeless matter ; but, according to either idea, the invisible particles, which are taken up by the absorbents, have not the property which common observation makes the characteristic of life, that is, organization or vascularity.

9th. From the structure of the omentum. It is vascular for the secretion, and cellular for the reception of fat, and is provided with lymphatics for its removal.

10th. Lastly, I infer that the intention of the omentum is to afford nourishment to the body, from the connection of certain states of this viscus with the diseases of the liver. The fat of the body, without a liver to change it, would have been useless as to its most important property. The diseases of the latter might be supposed to have an influence upon the former, and accordingly a diseased liver has been found, in many instances, to be accompanied by an unnatural state of the omentum. In some cases where, it is true, this viscus should have been deprived of fat, it has been found preternaturally distended with it. But, fortunately for my argument, the liver has, in these cases, been also diseased. I admit, it may be shown from the accounts of dissections, that the liver has been disordered, and yet the fat of the omentum properly absorbed ; nay, the membranes which inclose it have been destroyed. This I shall answer by observing, first, that a diseased appearance in the substance of the liver, does not prove a derangement of its secreting organs ; and, secondly, admitting this, much more knowledge on the subject is required to determine that these alterations did

not take place before the liver became thus diseased. It is sufficient, then, if I can give one or two instances of this correspondence in disease, in the two viscera; the exceptions are explained by the two foregoing observations.

Lieutaud mentions some cases of this kind. I shall relate one of them. In his observation 227, he says, “*Quidam consistensibus ætatis obesus, et jam dudum asthmaticus; tandem in ischuriam lethalem incidit. Secto cadavere, deprehenditur omentem, ob majorem adipis copiam; et pondo trigenti librarum. Hepar erat mole maximum.*”

In Heister’s observations* is related the case of a patient who died of extreme emaciation generally, but in whom the omentum was found “very fat.” He had before death been long troubled with a diarrhœa, which indeed indicated a disease of the liver, and the dissection proved that viscus to be in a morbid state. But what was of much more importance, as it proved the *secretion* of that organ to be altered, was that the patient, during his illness, was troubled with eructations of matter resembling “bile in being acrid, but destitute of its bitter or acid taste.”

Here was a case, where, from the wasting diarrhœa that attended, no fat would have been expected to be found in the body; and yet here is an omentum loaded with it. The liver was diseased, and incapable of converting the fat to nourishment. In this state, then, there was no need of absorption, and consequently we

* Observation ccclxxxjii.

find none. It may be said, that, as it had disappeared from the other parts of the body, may not some other cause than the disease of the liver have been the reason why it also was not taken up? This I would answer by observing, first, that the fat of the other parts of the body being less in quantity than in the omentum, would be much sooner absorbed, and this may have taken place before the liver was so far deranged as to be incapable of the office of chylicification; or, secondly, if it shows the agency of any other cause, it is that the lymphatics of the omentum and the other parts of the body have different degrees of power; a fact that would turn to my advantage; for, if the fat in the two situations have different intentions, we should expect to find some of their other circumstances different.

Mr. Proust, in his Dissections*, relates a case that helps to illustrate this question. A patient, who had been much troubled with bilious complaints, was seized with indigestion and vomiting; and these were succeeded by a diarrhœa, of which, after three weeks' continuance, he died. On opening the body, much fat was found everywhere, and the omentum "entirely occupied by it." *The liver was of a remarkable size.* Now, if any thing could have given rise to an absorption, it would have been the wasting of a diarrhœa, and the want of nourishment which a diseased stomach must have occasioned. Yet here is a body "*embon-point assez*," to use his own words.

* Observation xxv.

The pulmonary consumption, more than any other disease, is attended by an emaciation, arising, most probably, from the chronic nature of that complaint. It is certain that the proper and natural supply of materials for the action of any viscus are necessary for its health. Perhaps, then, the diseases of the liver that attend upon consumption, arise from its want of the proper substance for its action. Perhaps, too, the want of that natural supply gives rise to a vitiated secretion, which may be the cause of the wasting diarrhœa that commonly terminates that disease.

Concerning the disappearance of fat by disease, it deserves to be remarked, that by fasting the action of the lymphatics is increased. If it were not so, fat could not be removed. Now, we know that the want of food by the stomach, almost always causes an absorption of fat*.

* Perhaps, under this remark, it might not be amiss to notice the practical benefit to be derived from this disposition of the lymphatics to take on a preternatural action during fasting. It teaches us to endeavour, by abstinence, to promote the absorption of collections of water in dropsy. That it should not oftener succeed, is owing to the interference of some cause that continues the disease. If the *removal* of water were the only ~~obstacle~~ to the cure of dropsy, I have no doubt that abstinence would, in almost every case, be effectual. There are many instances on record of the advantage of this remedy. I shall relate one from Sir John Hawkins's Life of Dr. Johnson. juv

"A few days after," says sir John, "he (Dr. Johnson) sent for me, and informed me, that he had discovered in himself the symptoms of a dropsy, and, indeed, his very much increased bulk, and

I have thus gone through the several heads of the reasons for my belief on this subject. If any one or two of them appear not conclusive, or even objectionable, let it be remembered that the evidence does not rest upon them alone. If the whole, taken together, should amount to proof, it is sufficient.

There remain yet some facts, connected with the subject, which, not being referrible to any of the foregoing heads, may properly be considered here.

It is said that the omentum of herbivorous animals is in general more fat than that of carnivorous. It is also said that the same peculiarity distinguishes those whose motions are sluggish, from those whose habits

the swollen appearance of his legs, seemed to indicate no less. It was on Thursday that I had this conversation with him; in the course thereof he declared, that he intended to devote the whole of the next day to *fasting*, humiliation, and such other devotional exercises as became a man in his situation. On the Sunday following I made him a visit, and, upon entering his room, I observed in his countenance such a serenity, as indicated that some remarkable crisis of his disease had produced a change in his feelings. He told me, that, pursuant to the resolution he had mentioned to me, he had spent the preceding day in an abstraction from all worldly concerns; that, to prevent interruption, he had in the morning ordered *Frank* (his servant) not to admit any one to him, and, the better to enforce his charge, had added these awful words, *for your master is preparing himself to die*. He then mentioned to me, that, in the course of this exercise, he found himself relieved from the disease which had been growing upon him, and was becoming very oppressive, viz. the *dropsy*, by the gradual evacuation of water, to the amount of *twenty pints*; a like instance whereof he had never before experienced."

of life are more active. One answer will be sufficient for both these facts. Nature, in the formation of animal bodies, has never made qualities to oppose each other. Fat may have been very necessary for the nourishment of those animals whose wants required physical alertness; yet the existence of fat would have been inconsistent with this last quality. A more important function would hardly have been made subservient to one less necessary. The fatness of herbivorous animals is owing to the abundance of their food, not requiring much exertion to obtain it. The herbivorous are fat, because they require not activity. Carnivorous are lean, because fat would have been an incumbrance.

Another fact to be referred to this division of the subject, is the fat found in the abdomen of horses. "*Equis a concusso per magnos motus omento adipem non in venas redire, sed in abdominis caveam quasi fusum clabi, et intestinis circumfundi**."

It has been said before, that the omentum is a secretory organ. In this case, the fat is secreted in a preternatural quantity, to such a degree, indeed, that the cells of the membrane cannot contain it. Hence they are ruptured, and it is poured into the abdomen. The idea, that there is a greater quantity of fat, is corroborated by the circumstance of its being altered in quality. It is found "*quasi fusum*," which plainly shows its secretion to be changed: fat, in its natural state, never has

* Haller's *Elementa Phys.* vol. vi, p. 384.

that form. Why violent exercise should give rise to this preternatural secretion, I cannot pretend to say.

Some notice has before been taken of the unequal quantities of fat in different parts of the body. Collections of it are often found about the heart, and in the extremities, whilst other parts are much emaciated. As the removal of the fat is performed by the absorbents, it must be influenced by any irregularities that may occur in that system. In addition, then, to the reasons that have already been given for the partial remains of fat, I shall observe that the lymphatic, like every other system in the body, may be partially diseased. Hence a preternatural activity of one part will cause a speedy removal, whilst a torpor in another will prevent any absorption of the fat.

Another fact, which goes not so much to support the main object of this essay, as to prove the nutrient property of the fat, and its use in the body, is the circumstances of those persons who are under the effects of famine. Dumas, speaking of long-continued abstinence, says, "It is worthy of remark, that the examples of this kind have principally women for their object." Now, it is a fact confirmed by anatomists, that fat is proportionally more abundant in children and *females*.

I have thus in a cursory manner considered some of the leading points of this subject. It has been more my wish to establish a new opinion, than to enter minutely into circumstances already ascertained; although, for the purpose of the former, much of the latter has been necessary. Many facts and opinions have been

omitted, which time would not allow, and which the occasion of my writing forbids me to mention. To have considered the subject in all its connections would have been to extend it to too much length. The unity of nature has forbidden a separation of different sciences; much less can a line be drawn through those subdivisions which have been designated by the names of particular sciences.

Thus far the subject has been considered in relation to theory. The speculative part of every science is its shadow only. We meet it first, because the light is placed behind it. I shall take leave of it by considering a few of the practical applications of the subject.

The first inference that presents itself, from the doctrine I have delivered, is an argument for copious and protracted blood-letting. "In an adult man," says Richerand, "of moderate rotundity, the adeps constitutes a twentieth part of the weight of the body*." This, upon a moderate computation, would give seven pounds of fat for the supply of the body; a quantity sufficient for its nourishment a considerable time. That it should not sustain it as long as the same quantity of aliment taken by the stomach should not surprise us, for some of the effects of famine are to be considered as arising, not from the want of additions to the body, but from the derangements which the system suffers through the medium of the stomach. The proper state of this viscus is necessary to the health of the whole body. When the

* Richerand's Physiology, article lxxv.

absence of its natural secretion causes disease there, no wonder that the evil of famine is doubled. We should in vain attempt to subdue a pulse by blood-letting, if, at the same time, we should give rich soups to our patients, and yet even a more nutritious substance than this the body is supplied with by its fat. Depletion, when required, may be continued till that quantity appears to be exhausted, for not till then will it be effectual. Whence, if not from the fat, can be derived the full pulse which attends a chronic fever, when blood has been copiously drawn, and the stomach has long rejected food? Let not, then, the fear of weakness from venesection or abstinence forbid the use of the lancet.

Secondly, From the preceding facts and reasonings, can be drawn an answer to the common objections to fasting in the cure of inflammatory fevers, or other diseases requiring depletion. I have already spoken of an *advantage* to be derived from the use of this remedy in dropsy. The *evils* that are apprehended from this mode of treatment, are all prevented by the slow, yet equable supply of nourishment which the fat supplies to the body.

A third observation, more particularly applicable to the function of the liver, is the case of a diseased stomach, when it cannot perform its office in chylopoiesis. That wisdom which made the stomach, foresaw its derangement; and it completed the fabric of the body, by giving fat to supply the place of food, and a liver for its conversion into nourishment.

Lastly, let us subscribe to the doctrine of final causes. Aliments, according to their nutrient power, have been divided into grades. Sugar, as containing the most nourishment under the least bulk, ranks first in this order. Oil is next to this; and fat, as uniting other properties for the advantage of the body, was the most suitable substance for its purpose. That obesity which to our eyes may sometimes appear disgusting, is perhaps not a partial evil, but a general benefit. The omentum, which has been considered as useless, or supposed to perform very subordinate functions in the system, appears, from the foregoing facts and reasonings, to be a store of aliment for disease and famine.

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